Ening bushing, and C the loose bushing. Both of these bushings are hardened and ground so that they will stand constant use and wear for some length of time. When no removable bushings are required, the lining bushing itself becomes the drill bushing or reamer bushing, and the inside diameter of the lining bushing will then fit the cutting tool used. The bushing shown in Fig. i is cheaper to make, and will work fully as well, when driven in place in the hole receiving it, as do bushings having a shoulder at the upper end, such as the loose bushing shown in Fig. 2. It was the practice some years ago to make all bushings with a shoulder, but this is unnecessary, and simply increases the cost of making the bushing.

Material for Jig Bushings. — Bushings are generally made of a good grade of tool steel to insure hardening at a fairly low temperature and to lessen the danger of fire cracking. They

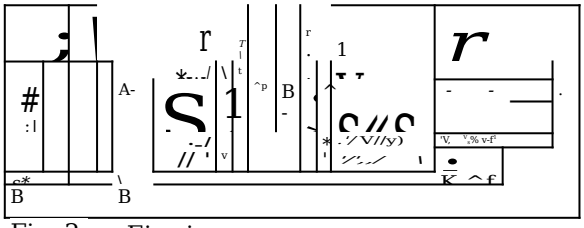

Fig. 2. Fig. i.

can also be made from machine steel,' which will answer all practical purposes, provided the bushings are properly case-hardened to a depth of about |V inch. Sometimes bushings for guiding tools may be made of cast iron, but only when the cutting tool is of such a design that no cutting edges come within the bushing itself. For example, bushings used simply to support the smooth surface of a boring-bar or the shank of a reamer might, in some instances, be made of cast iron, but hardened steel bushings should always be used for guiding drills, reamers, taps, etc., when the cutting edges come in direct contact with the guiding surfaces. If the outside diameter of the bushing is very large, as compared with the diameter of the cutting tool, the cost of the bushing can sometimes be reduced by using an outer cast-iron body and inserting a hardened tool steel bush-